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November 4, 1980

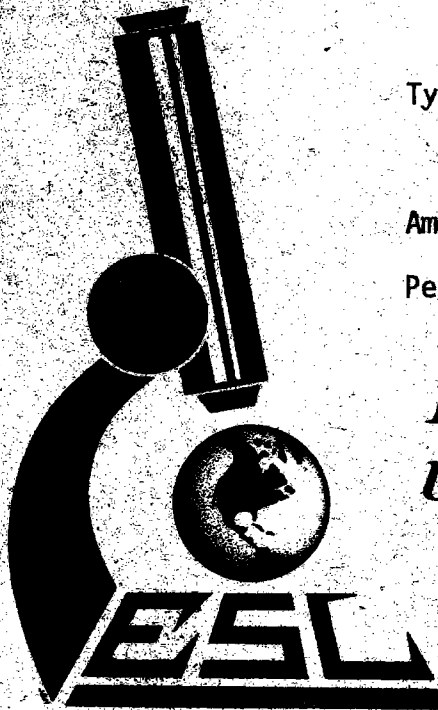
IDAHO OPERATIONS OFFICE
U. S. DEPARTMENT OF ENERGY
550 Second Street
Idaho Falls, Idaho 83401

Title: Technical Support for M-X
Geothermal Assessment and Applications
Development Task

Type of Request: Expansion of Contract No.
DE-AC07-80ID12079

Amount Requested: \$898,351

Period of Performance: October 1, 1980 - September 30, 1981



EARTH SCIENCE LABORATORY
University of Utah Research Institute
Salt Lake City, Utah

Principal Investigator: S. H. Ward

Co-Investigators: D. L. Nielson
P. M. Wright

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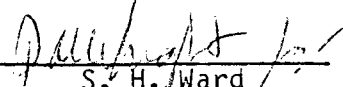
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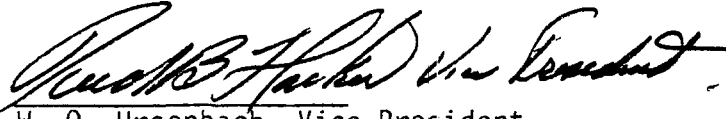

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INTRODUCTION

This proposal outlines the work necessary to help determine the feasibility of utilizing geothermal energy as a major alternative Renewable Energy System (RES) for the deployment of the M-X missile system in the Nevada and Utah. ESL/UURI will work in close coordination with other DOE contractors, namely EG&G, Idaho, Inc., MacKay Minerals Research Institute (MMRI) and the Utah Geological and Mineral Survey (UGMS), to accomplish the complete M-X/RES Geothermal Assessment and Applications Development Task. ESL will provide principal technical and planning support to the ID/NV Joint Task Group through contract with DOE/ID.

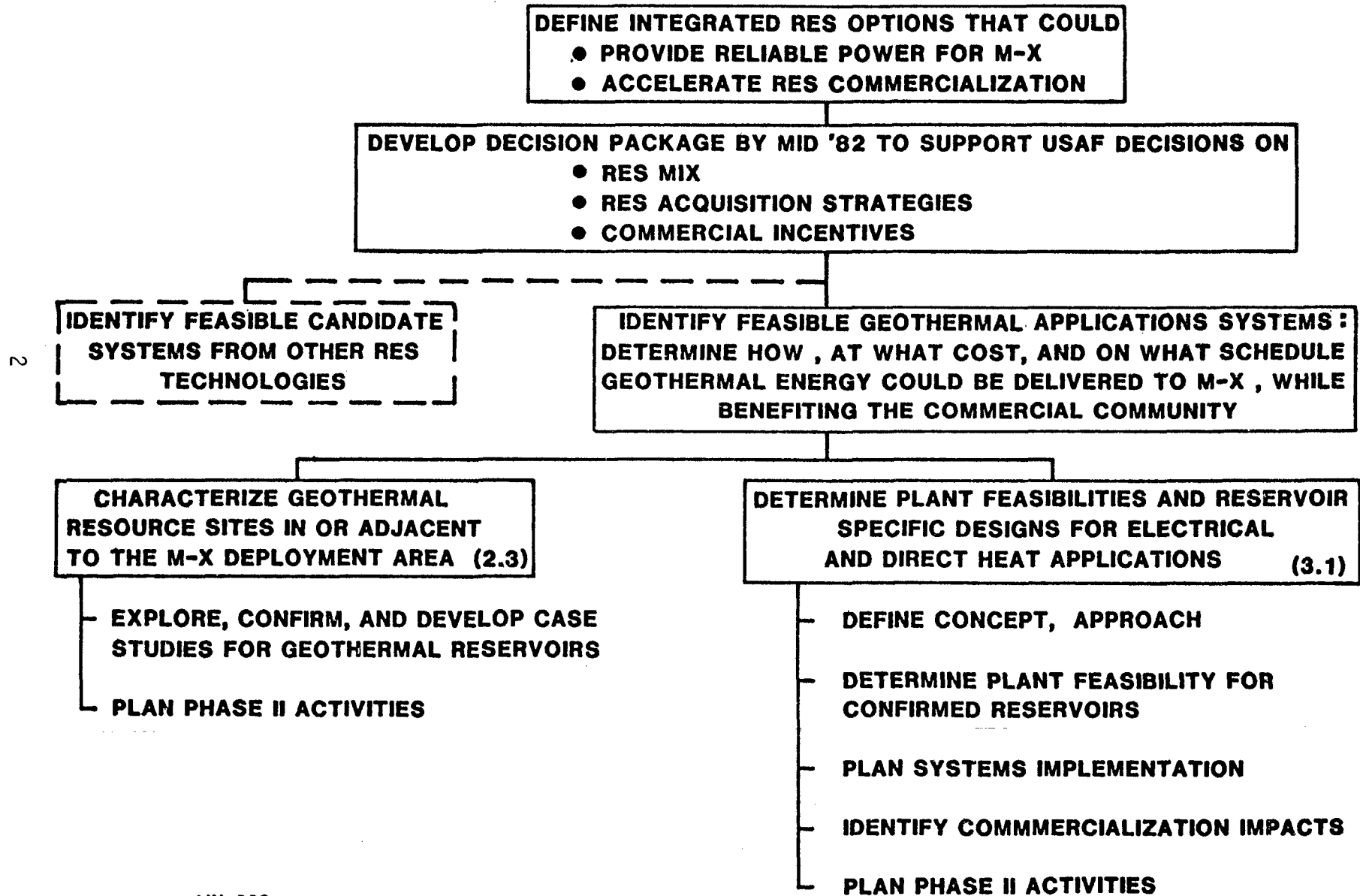
The Objectives Hierarchy for the overall M-X/RES Project Geothermal Task is illustrated in Exhibit I. This chart brings the planned Phase I geothermal activities into perspective with the M-X/RES Project objectives by providing a hierarchy that translates the top level Project objectives into specific geothermal objectives. The viability of the two Phase I Project objectives shown in the top box will be evaluated in the mid-1982 Decision Package, which in turn will be supported by the identification of feasible candidate RES systems including geothermal, solar, wind and others.

The overall Phase I geothermal objective of identifying the feasible candidate geothermal applications systems, will be accomplished by DOE/ID, DOE/NV and ESL/UURI, as well as the contractors named above, by determining the technical viability of cost-effective and timely delivery of electric or non-electric energy to the M-X system. This can be evaluated by characterizing appropriate geothermal resource sites and by determining the feasibility of use of these resources for power generation or direct application. Program elements to accomplish this objective will be tailored to satisfy the near-term schedule constraints of the M-X program while also addressing long-term commercial benefits and furthering the state of the art of geothermal exploration and assessment technology. Note that the objectives for characterizing resources and determining technical/cost/schedule viability are compatible with M-X/RES Project Work Breakdown Structure (WBS) Elements 2.3 and 3.1, respectively. The sub-objectives shown to support these two geothermal objectives are also compatible with third and fourth level WBS elements of the Geothermal Assessment and Applications Development Task Plan.

Implementation of the work proposed herein will take place under the management of the Idaho Operations Office of DOE.

EXHIBIT I

M-X/RES PROJECT GEOTHERMAL TASK
PHASE 1 OBJECTIVES HIERARCHY



OBJECTIVES AND STRATEGY

The overall objectives of the work proposed herein are twofold, i.e.;

- (1) To assess the feasibility and economics of utilizing geothermal energy as one of the possible alternative Renewable Energy Systems (RES) to provide electrical power and/or direct building space conditioning requirements for the M-X Missile Project, and
- (2) To accelerate the commercialization of geothermal energy systems.

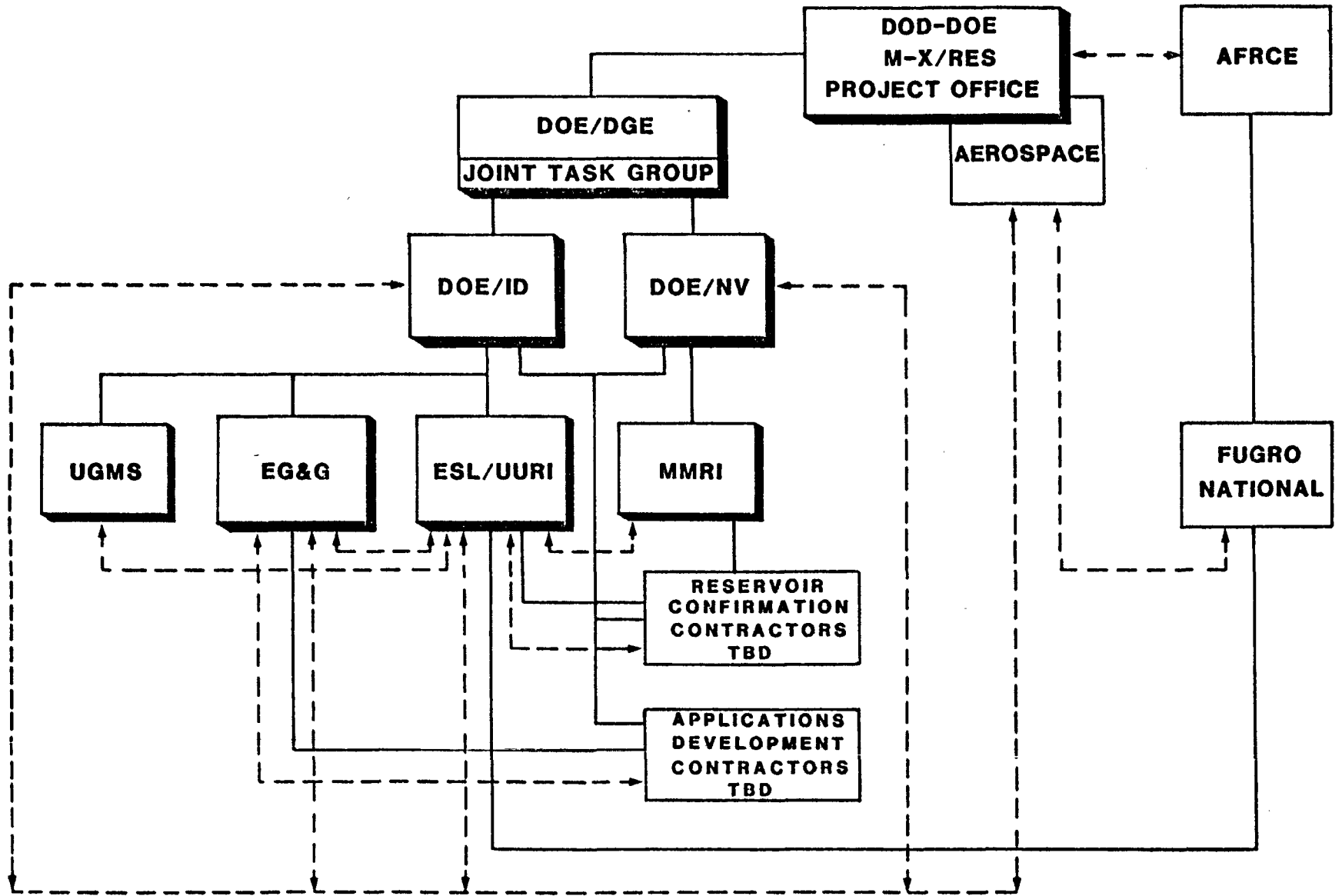
The more specific responsibility of the Geothermal Assessment and Applications Development Task is to provide geothermal resource and application information for use by DOE/DOD in deciding if geothermal energy can be utilized to make a significant contribution to the proposed Nevada/Utah M-X system energy requirements.

Geothermal resources are abundant in Utah and Nevada, within and adjacent to the conceptual M-X deployment area. Some of these resources are known to be high enough in temperature for electrical power generation. In addition, numerous geothermal occurrences, such as thermal springs and wells, are known to exist within the deployment area. The full potential as Renewable Energy Sources for these surface expressions of geothermal activity has not yet been evaluated.

The Task Management Plan now in preparation, for the Geothermal Assessment and Applications Development Task, outlines the strategy for achieving the objectives stated above. This strategy involves the participation of various federal agencies, research organizations and private sector companies and utilities. Due to the short time frame available for the completion of this task, DOE has decided to utilize participants and established procedures from its already existing geothermal programs to achieve the stated objectives. In the earth sciences, these programs are the Industry Coupled Program, the State Coupled Program and the Geothermal Exploration and Assessment Technology Program. The Earth Science Laboratory (ESL) provides primary technical assistance to DOE on all of the above programs. ESL will serve as the primary technical support contractor to DOE on the Geothermal Assessment and Applications Development Task.

The functional relationships of the responsible federal agency, industry and laboratory groups organized to accomplish the Geothermal Assessment and Applications Development Task are illustrated in Exhibit II.

EXHIBIT II
**M-X/RES GEOTHERMAL ASSESSMENT AND APPLICATIONS
 DEVELOPMENT TASK
 FUNCTIONAL RELATIONSHIPS**



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— CONTRACTUAL
 - - - COORDINATION & INFORMATION

release of data to the public.

e) Provides planning, technical review and briefing assistance to DOE/DGE as requested.

3. DOE/ID FIELD OFFICE

Field Manager: Leland L. Mink Associate Field Manager: Russell D. Lease

a) Contracts for and directs day-to-day implementation of:

- 1) Work supporting field exploration for high- and low-to-intermediate temperature geothermal reservoirs and reservoir confirmation, including drilling for low- and intermediate-temperature reservoirs in the State of Utah (through ESL and UGMS).
- 2) Work supporting the conceptual definition of M-X geothermal applications, planning for implementation, and analysis of the impact on commercialization (through EG&G and ESL).
- 3) Technical planning and review assistance; data file development and management; monthly report review, consolidation, and submission (through ESL, EG&G, and UGMS).

b) Consolidates contractor monthly schedular and expenditure progress reports, develops a management assessment of status and/or problems and recommends solution. Implements those solutions after approval of the DOE/DGE.

c) Reviews technical reports and approves their submittal to DOE/DGE and to the M-X/RES Project Office.

4. DOE/NV FIELD OFFICE

Field Manager: Joseph N. Fiore Associate Field Manager: Allen J. Roberts

a) Contracts for and directs the day-to-day implementation of:

- 1) Work supporting field exploration for high- and low-to-intermediate temperature geothermal reservoirs and reservoir confirmation, including drilling for low- and intermediate-temperature reservoirs in the State of Nevada (through MMRI).
- 2) Industry cost-shared drilling activities associated with potential reservoirs of all temperatures in Nevada and Utah, utilizing ESL approved work scopes and activities (Contractor(s) TBD).

3) Feasibility studies relating to the utilization of initial high-temperature reservoirs for the generation of electrical power, utilizing EG&G approved work scopes and activities (through Contractor(s) TBD).

b) Consolidates contractor monthly scheduler and expenditure progress reports, develops a management assessment of status and/or problems and recommended solutions, and implements these solutions after approval of the DOE/DGE.

c) Reviews technical reports and approves their submittal to DOE/DGE and to the M-X/RES Project Office.

d) Schedules and coordinates all contact and communication with State of Nevada governmental entities relating to M-X/RES Geothermal Assessment and Applications Development.

5. EARTH SCIENCE LABORATORY DIVISION/UNIVERSITY OF UTAH RESEARCH INSTITUTE (ESL/UURI)

Project Manager: Dennis L. Nielson Alternate Contact: Phillip M. Wright

a) Contractor to DOE/ID.

b) Provides DOE/ID, DOE/NV and the Joint Task Group (JTG) primary technical planning and coordination assistance for the M-X/RES Geothermal Task.

c) Implements assigned technical portions of Geothermal Task including:

1) development of exploration and reservoir confirmation strategies and data requirements;

2) detailed exploration and reservoir confirmation at initial and other high-temperature sites, in cooperation with industry lease-holders;

3) commercialization analyses, in conjunction with EG&G.

d) Assists DOE/ID, DOE/NV, and the Joint Task Group in technical review of exploration, reservoir confirmation, and drilling contractors, including UGMS, MMRI, and other contractors TBD.

e) Coordinates acquisition by other contractors of geoscience and related data from industry and private sectors.

f) Establishes a central data file for the storage of all M-X/RES Geothermal data including proprietary data. Organizes the release of non-proprietary data through public open-file with approval of the JTG.

g) Coordinates the flow of geothermal assessment data and analyses of those data, to GSE/I.

h) Schedules and coordinates all contacts and communication with State of Utah governmental entities relating to M-X/RES Geothermal Assessment and Applications Development Task.

6. EG&G, IDAHO, INC.

Project Manager: Thomas W. Lawford Alternate Contact: Charles R. Broadus

a) Contractor to DOE/ID.

b) Provides DOE/ID, DOE/NV, and the Joint Task Group technical and planning assistance on the Applications Development portion of the M-X/RES Geothermal Task.

c) Implements assigned technical portions of Geothermal Task, including:

- 1) development of candidate geothermal applications;
- 2) collection and analysis of Geothermal Applications data;
- 3) reservoir engineering at assigned sites; and
- 4) commercialization analysis in conjunction with ESL.

d) Assists DOE/ID, DOE/NV, and the Joint Task Group in technical review of applications development contracts.

e) Purchases applications development data after approval of the DOE/ID, and contracts for applications development studies by appropriate contractors.

f) Releases appropriate Geothermal Applications data through public open-file.

g) Provides applications data and analysis to GSE/I with copy to ESL for master data file.

7. MACKAY MINERALS RESEARCH INSTITUTE (MMRI)

Primary Contact: Dennis L. Trexler Alternate: James L. Bruce

a) Contractor to DOE/NV.

b) Provides technical proposals, planning to ESL and the Joint Task Group.

c) Performs assigned portions of task, including:

- 1) Geothermal assessment for low- and intermediate-temperature geothermal systems at candidate Operating Base sites in Nevada.

- 2) Reconnaissance and detailed exploration for other high-temperature geothermal systems in the deployment area of Nevada.
- 3) Collection, reduction, and analysis of data from the above efforts and transmittal of such data to ESL.

d) Publishes data and analysis as appropriate to benefit the commercialization of geothermal resources.

e) Purchases existing geoscience data and subcontracts for surveys after coordination with ESL and approval of DOE/NV.

8. UTAH GEOLOGICAL AND MINERAL SURVEY (UGMS)

Primary Contact: Peter J. Murphy Alternate Contact: Wallace Gwynn

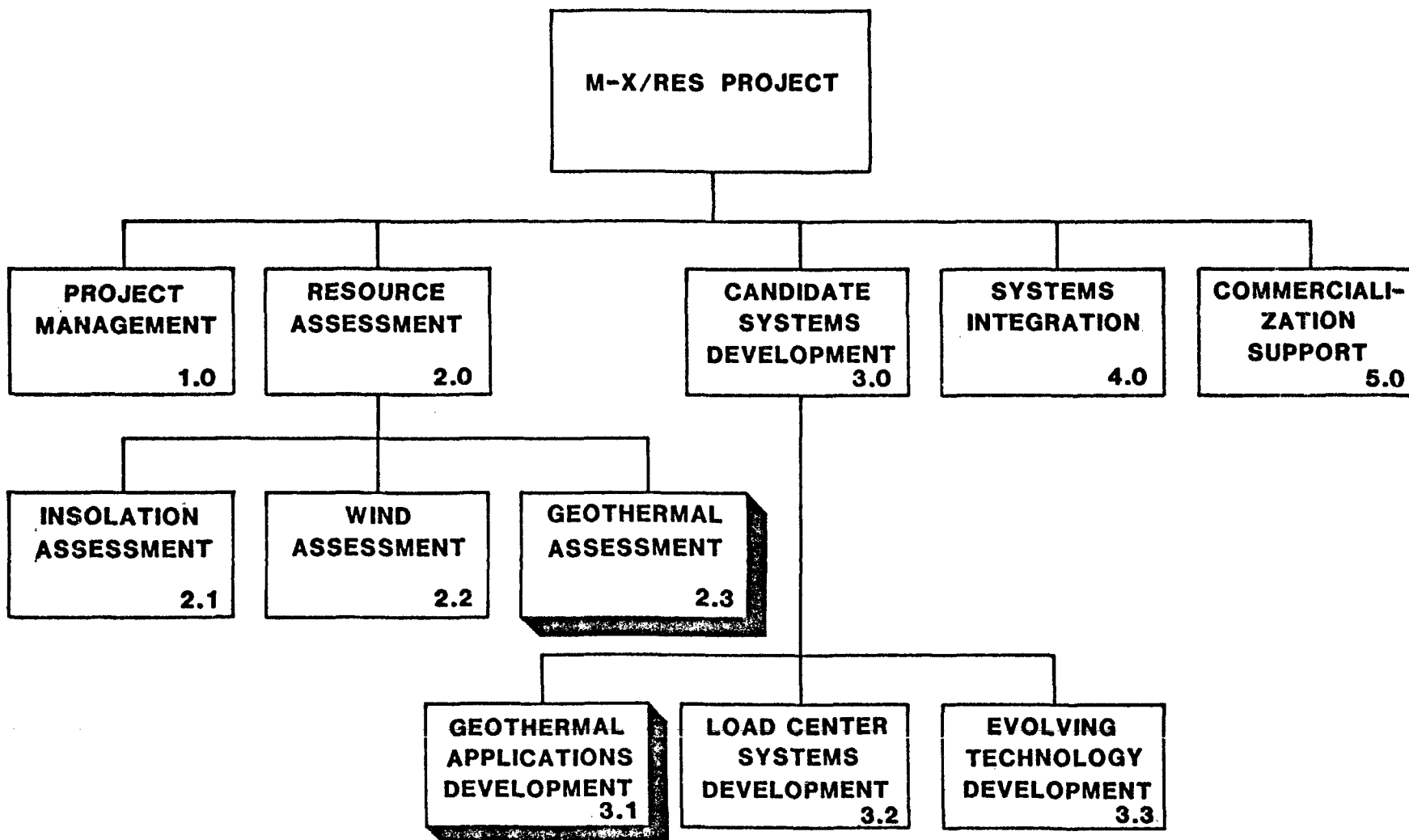
- a) Reports to DOE/ID.
- b) Provides technical proposals and planning assistance to ESL and to the Joint Task Group.
- c) Implements assigned portions of task, including:
 - 1) Geothermal assessment for low- and intermediate-temperature geothermal systems at candidate Operating Base sites in Utah.
 - 2) Reconnaissance and detailed exploration for other high-temperature geothermal systems in the deployment area of Utah.
 - 3) Collection, reduction, and analysis of data from the above efforts and transmittal of such data to ESL.
- d) Publishes data and analysis as appropriate to benefit the commercialization of geothermal resources.

WORK BREAKDOWN STRUCTURE

The Work Breakdown Structure for elements of the assigned task are as follows;

Exhibit III illustrates the position of the Geothermal Assessment and Geothermal Applications Development work elements relative to the top-level M-X/RES Project work breakdown structure. Taken together, Geothermal Assessment (WBS 2.3) and Geothermal Applications Development (WBS 3.1) constitute what we have termed the "M-X/RES Geothermal Task."

EXHIBIT III
M-X/RES PROJECT
WORK BREAKDOWN STRUCTURE

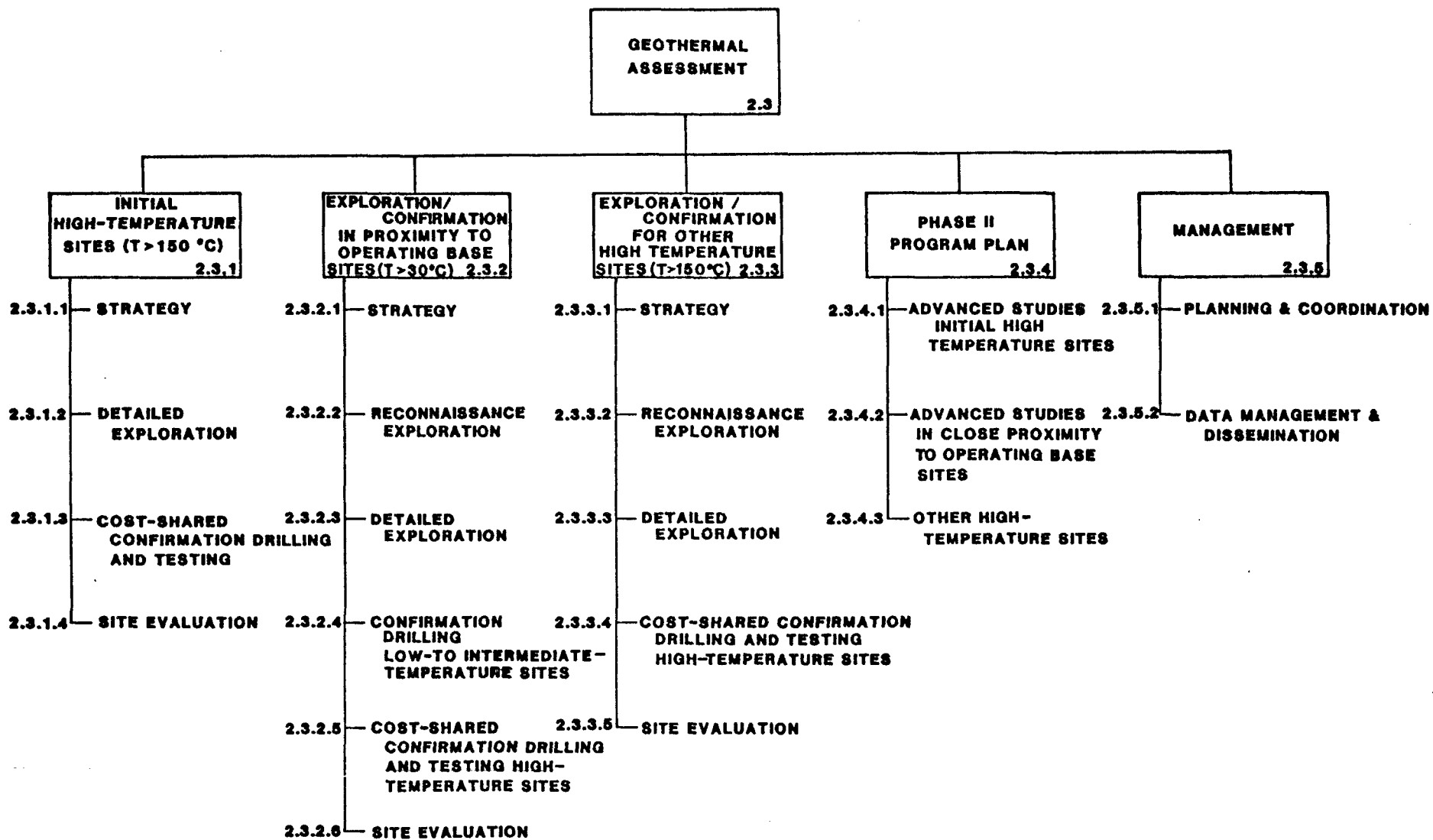


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Exhibit IV shows the third-level of the WBS pertaining to Geothermal Assessment. Elements 2.3.1, 2.3.2, and 2.3.3 reflect the three main elements of the strategy, i.e. the three separate activity paths as previously discussed on the technical approach overview.

EXHIBIT IV

PHASE I GEOTHERMAL ASSESSMENT WORK BREAKDOWN STRUCTURE



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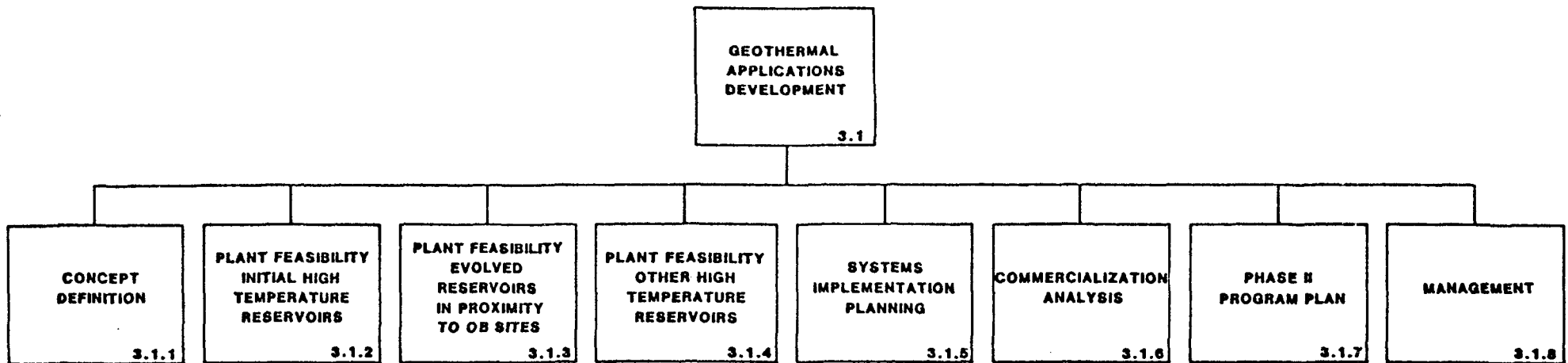
Exhibit V shows the third-level of the WBS pertaining to Geothermal Applications Development. Plant feasibility studies are planned for the three activity paths previously discussed on the technical approach overview. System implementation planning will be performed at specific reservoir sites that are confirmed as a result of Geothermal Assessment activities. Commercialization analyses will be performed on all data and communicated to the geothermal community.

EXHIBIT V

M-X/RES PROJECT

GEOHERMAL TASK

PHASE I GEOHERMAL APPLICATIONS DEVELOPMENT WORK BREAKDOWN STRUCTURE



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STATEMENT OF WORK

Earth Science Laboratory Division/University of Utah Research Institute

2.3 Phase I: Geothermal Assessment Work Breakdown Structure

2.3.1 Initial High-Temperature Site Evaluation

This task will involve cost-shared detailed exploration and confirmation drilling and testing by geothermal exploration companies. ESL will be involved as follows;

1. Formulation of strategy, including review of information, to determine site priorities.
2. Review of cost-shared proposals from companies.
3. Analysis of exploration data collected by companies.
4. Completing exploration information where necessary, through field collection of such data as: geologic mapping and structural evaluation, geochemical surveys, and geophysical surveys. The above data will be modeled and integrated with company supplied data.
5. On site geologic work during drilling including the logging of drill cuttings and the inspection of geophysical well logs and flow test information to provide DOE/ID and DOE/NV with an up-to-date evaluation of the status of the projects and recommendations on the future of the projects.
6. Storage and curation of all chip samples in the Geothermal Sample Library.
7. Analysis of geophysical well logs.
8. Participate with EG&G in testing and evaluation of the geothermal reservoirs.
9. Provide a continuing up date to DOE/ID, DOE/NV, and GSE/I on conclusions of exploration and drilling work along with supporting data.
10. Develop exploration case studies from information collected. This will provide a retrospective evaluation of the site selection and the exploration methods employed. This form of retrospective evaluation will result in suggestions for improvement of geothermal exploration and assessment technology.

2.3.2 Exploration/Confirmation in Proximity to Operating Base Sites

Initial field work will be performed by the Utah Geological and Mineralogical Survey (UGMS) and the Mackay Minerals Research Institute (MMRI). If evidence of high-temperature hydrothermal resources are found, efforts will be made by ESL to interest exploration companies in continuing the high-temperature site development. If this later option is realized, ESL participation would be as outlined under 2.3.1. In the other areas where the work will be done by MMRI and UGMS, ESL's task would be as follows;

1. Develop strategy for exploration of the Operating Base sites including site prioritization in coordination with UGMS, MMRI, DOE/NV and DOE/ID.
2. Provide technical assistance and coordination to UGMS and MMRI.
3. Contract for, or coordinate, acquisition of exploration data from industry and private sources.

2.3.3 Exploration/Confirmation for Other High-Temperature Sites

Initial field work will be performed by UGMS and MMRI. If evidence of high-temperature hydrothermal resources are found, efforts will be made to interest exploration companies in continuing the development. If the latter option is realized, ESL participation will be as outlined under 2.3.1. In the early stages of the exploration, where the work will be done by MMRI and UGMS, ESL's task will be as follows;

1. Develop strategy for exploration for other high-temperature sites in coordination with UGMS, MMRI, DOE/NV and DOE/ID.
2. Provide technical assistance to UGMS and MMRI.
3. Contract for or coordinate acquisition of exploration data from industry and private sources.

2.3.4 Phase II Program Plan

Develop the Phase II (post mid-'82) Task Plan for Geothermal Assessment. The plan will incorporate findings of Phase I activities. ESL's specific activity will be to organize and write the Phase II task plan in coordination with the Joint Task Group, DOE/NV, DOE/ID, EG&G, UGMS and MMRI.

2.3.5 Management

This element provides for planning and coordination, and data management and dissemination for the Geothermal Assessment portion of the Geothermal Assessment and Applications Development Task. ESL

responsibilities will be as follows;

1. Assist the Joint Task Group, DOE/NV and DOE/ID in technical review of exploration, reservoir confirmation and drilling activities.
2. Establish a central data file for the storage of all M-X/RES geothermal data.
3. Coordinate the flow of geothermal assessment data to and analysis of those data for GSE/I (The Aerospace Corporation).
4. Provide for public open-file of appropriate exploration data.
5. Schedule and coordinate all contacts and communications with the State of Utah governmental entities relating to M-X/RES Geothermal Assessment and Applications Development Task if requested.

3.1 Phase I: Geothermal Applications Development Work Breakdown Structure

3.1.6 Commercialization

Work will be performed in conjunction with the efforts of EG&G in the areas of market identification and commercial applications configuration and demonstration to promote the commercialization of geothermal energy. ESL's efforts will be concerned with matching resource characteristics with different types of applications.

3.1.7 Phase II Program Plan

Develop the Phase II Task Plan for Geothermal Applications Development in conjunction with the Joint Task Group, DOE/ID, DOE/NV, and EG&G.

3.1.8 Management

This element provides for planning and coordination and data management and dissemination for the Applications Development portion of the Geothermal Assessment and Applications Development Task.

ESL MANAGEMENT STRUCTURE

The Management Structure for the Earth Science Laboratory (ESL) for the Assessment and Development Task is illustrated in Exhibit VI and the overall DOE Project Management Structure is shown in Exhibit VII.

EXHIBIT VI

ESL MANAGEMENT STRUCTURE
GEOHERMAL ASSESSMENT AND APPLICATIONS DEVELOPMENT TASK

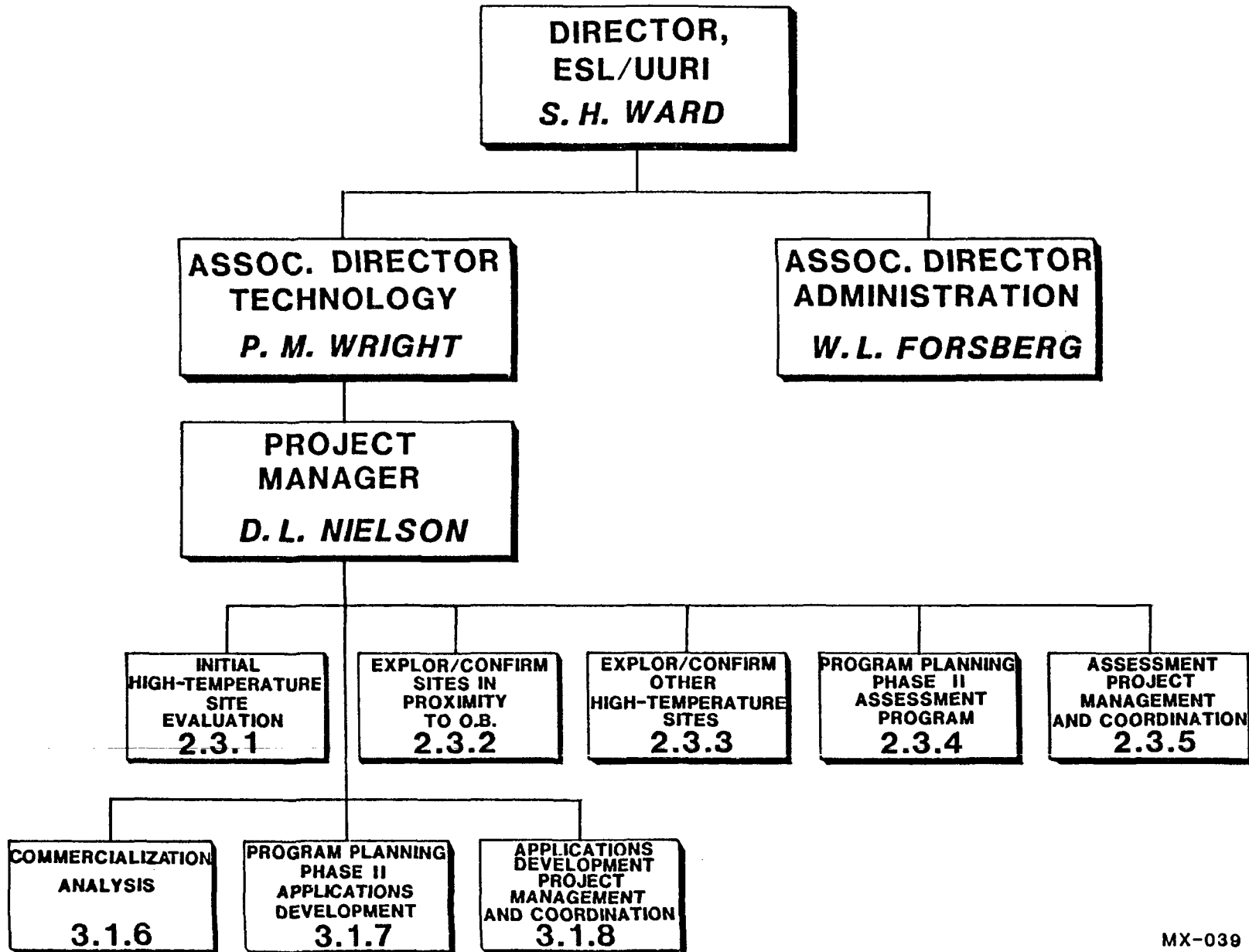
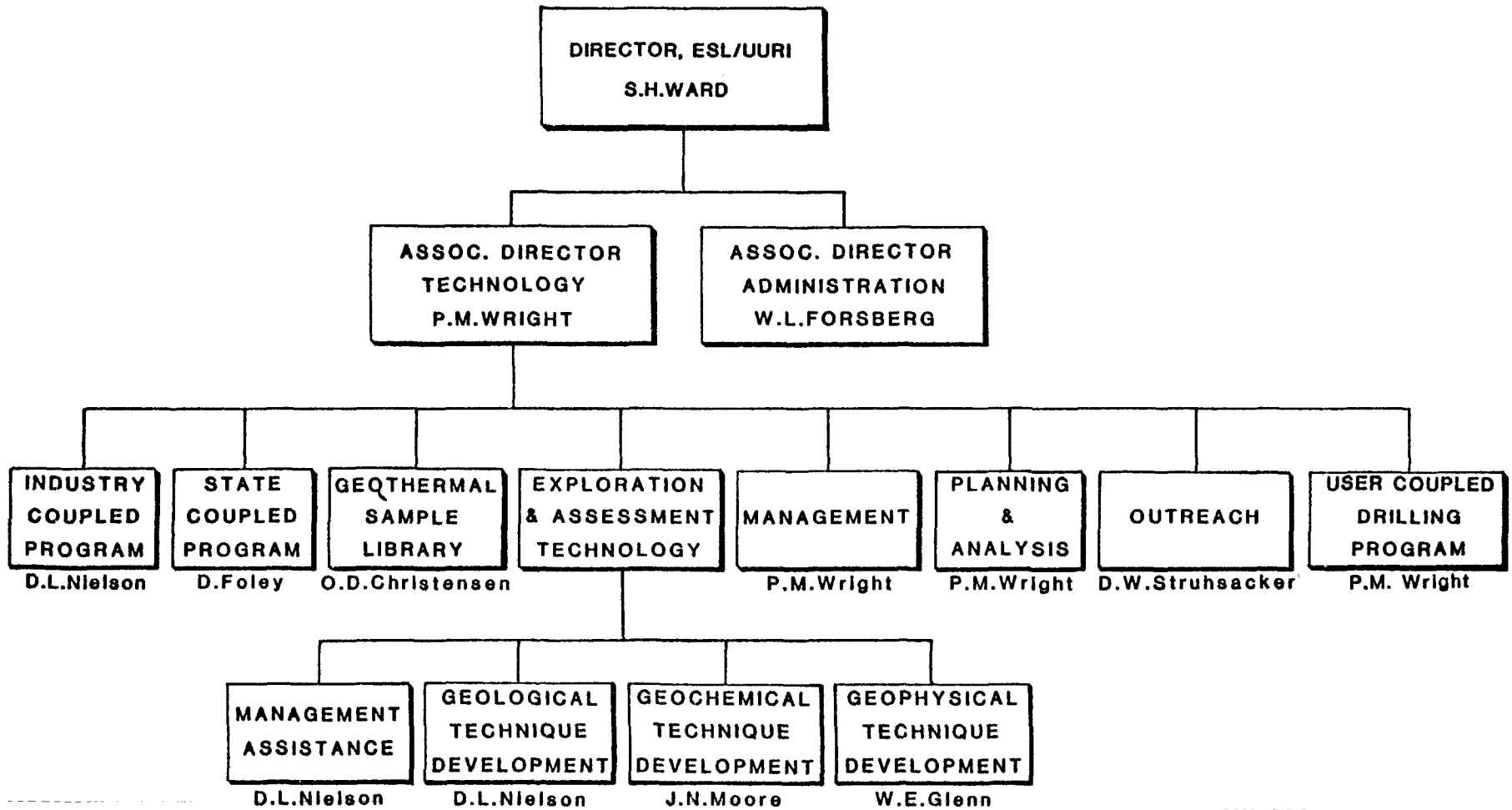


EXHIBIT VII

**EARTH SCIENCE LABORATORY
DOE PROJECT MANAGEMENT STRUCTURE**



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DELIVERABLES

In performance of the Geothermal Assessment and Applications Development Task, ESL will provide the following types of deliverables.

1. Documents describing the strategies to be employed in the performance of subtasks 2.3.1, 2.3.2 and 2.3.3.
2. Exploration case studies of the Initial High-Temperature sites and Other High-Temperature Sites and OB sites which are explored by industry on a cost-shared basis.
3. Public data releases of appropriate exploration data.
4. Establishment and maintainance of Geothermal Assessment and Applications Development Task Data Base.
5. Analysed resource data to GSE/I for the M-X/RES Data Base Book. The type of data required will be determined through discussions between ESL and GSE/I.

Budget Summary

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$288,135
a. Geologist	46.0	
b. Geochemist	14.5	
c. Geophysicist	22.0	
d. Contracts Specialist	6.0	
e. Computer Programmer	6.0	
f. Draftsperson	20.25	
g. Secretarial	14.25	
2. Hourly		
a. Student	45.0	<u>26,320</u>
Total Salaries and Wages		\$314,455

B. Employee Benefits

1. 41.6% of A.1	\$119,864	
2. 7% of A.2	<u>1,842</u>	
Total Employee Benefits		<u>\$121,706</u>

C. Total Salaries, Wages and Employee Benefits \$436,161

D. Expendable Supplies and Equipment 23,400

E. Travel 42,250

F. Reporting and Publications Costs 11,600

G. Data Processing 17,300

H. Other Costs 29,500

I. Total Direct Costs \$560,211

J. <u>Indirect Costs</u>	
1. 40% of I	224,084
K. <u>General and Administrative</u>	
1. 12% of I	<u>67,224</u>
L. <u>Total Direct, Indirect Costs and G&A</u>	\$851,519
M. <u>Management Allowance</u>	
1. 5.5% of L	<u>46,832</u>
N. <u>Total Costs</u>	<u>\$898,351</u>

Task 2.3.1 Initial High Temperature Site Evaluation

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$101,875
a. Geologist	24.0	
b. Geochemist	6.0	
c. Geophysicist	6.0	
d. Draftsperson	6.0	
e. Secretarial	3.0	
2. Hourly		
a. Student	15.0	<u>8,775</u>
Total Salaries and Wages		\$110,650

B. Employee Benefits

1. 41.6% of A.1	\$ 42,380	
2. 7% of A.2	<u>614</u>	
Total Employee Benefits		\$ <u>42,994</u>

C. Total Salaries, Wages and Employee Benefits \$153,644

D. Expendable Supplies and Equipment 12,500

E. Travel 8,500

F. Reporting and Publications Cost 4,000

G. Data Processing 6,500

H. Others Costs

1. Analyses 7,000

I. Total Direct Costs \$192,144

J. Indirect Costs

1. 40% of I 76,858

K. General and Administrative

1. 12% of I 23,057

L. Total Direct, Indirect Costs and G&A \$292,059

M. Management Allowance

1. 5.5% of L 16,063

N. Total Costs \$308,122

Task 2.3.2 Explore and Confirm Sites in Proximity to O.B.

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 48,430
a. Geologist	1.25	
b. Geochemist	4.25	
c. Geophysicist	7.25	
d. Contracts Specialist	3.0	
e. Draftsperson	2.5	
f. Secretarial	2.5	
2. Hourly		
a. Student	4.5	<u>2,630</u>
Total Salaries and Wages		\$ 51,060

B. Employee Benefits

1. 41.6% of A.1	\$ 20,147	
2. 7% of A.2	<u>184</u>	
Total Employee Benefits		\$ <u>20,331</u>

C. Total Salaries, Wages and Employee Benefits \$ 71,391

D. Expendable Supplies and Equipment 2,000

E. Travel 7,500

F. Reporting and Publications Costs 1,200

G. Data Processing 1,500

H. Other Costs -0-

I. Total Direct Costs \$ 83,591

J.	<u>Indirect Costs</u>	
1.	40% of I	33,436
K.	<u>General and Administrative</u>	
1.	12% of I	<u>10,031</u>
L.	<u>Total Direct, Indirect Costs and G&A</u>	\$127,058
M.	<u>Management Allowance</u>	
1.	5.5% of L	<u>6,988</u>
N.	<u>Total Costs</u>	<u>\$134,046</u>

Task 2.3.3 Explore and Confirm Other High Temperature Sites

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 48,430
a. Geologist	1.25	
b. Geochemist	4.25	
c. Geophysicist	7.25	
d. Contracts Specialist	3.0	
e. Draftsperson	2.5	
f. Secretarial	2.5	
2. Hourly		
a. Student	4.5	<u>2,630</u>
Total Salaries and Wages		\$ 51,060

B. Employee Benefits

1. 41.6% of A.1	\$ 20,147	
2. 7% of A.2	<u>184</u>	
Total Employee Benefits		<u>\$ 20,331</u>

C. Total Salaries, Wages and Employee Benefits \$ 71,391

D. Expendable Supplies and Equipment 2,000

E. Travel 4,000

F. Reporting and Publications Costs 1,200

G. Data Processing 1,500

H. Other Costs -0-

I. Total Direct Costs \$ 80,091

J. Indirect Costs

1. 40% of I	32,036
K. <u>General and Administrative</u>	
1. 12% of I	<u>9,611</u>
L. <u>Total Direct, Indirect Costs and G&A</u>	\$121,738
M. <u>Management Allowance</u>	
1. 5.5% of L	<u>6,696</u>
N. <u>Total Costs</u>	<u>\$128,434</u>

Task 2.3.4 Phase II Program Planning

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 8,945
a. Geologist	2.75	
b. Draftsperson	1.0	
c. Secretarial	1.0	
2. Hourly		<u>-0-</u>
Total Salaries and Wages		\$ 8,945

B. Employee Benefits

1. 41.6% of A.1		<u>3,721</u>
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C. Total Salaries, Wages and Employee Benefits \$ 12,666

D. Expendable Supplies and Equipment 1,000

E. Travel 2,500

F. Reporting and Publications Costs 500

G. Data Processing 600

H. Other Costs -0-

I. Total Direct Costs \$ 17,266

J. Indirect Costs

1. 40% of I		6,906
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K. General and Administrative

1. 12% of I 2,072

L. Total Direct, Indirect Costs and G&A \$ 26,244

M. Management Allowance

1. 5.5% of L 1,443

N. Total Costs \$ 27,687

Task 2.3.5 Project Management and Coordination

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 45,995
a. Geologist	8.0	
b. Geophysicist	1.25	
c. Computer Programmer	4.5	
d. Draftsperson	4.5	
e. Secretarial	2.25	
2. Hourly		
a. Student	11.25	<u>6,580</u>

Total Salaries and Wages \$52,575

B. Employee Benefits

1. 41.6% of A.1	\$ 19,134
2. 7% of A.2	<u>461</u>

Total Employee Benefits \$ 19,595

C. Total Salaries, Wages and Employee Benefits \$ 72,170

D. Expendable Supplies and Equipment 5,000

E. Travel 16,000

F. Reporting and Publications Costs 2,500

G. Data Processing 4,000

H. Other Costs

1. Basic Data Purchases 22,500

I. Total Direct Costs \$122,170

J.	<u>Indirect Costs</u>	
1.	40% of I	48,868
K.	<u>General and Administrative</u>	
1.	12% of I	<u>\$ 14,660</u>
L.	<u>Total Direct, Indirect Costs and G&A</u>	\$185,698
M.	<u>Management Allowance</u>	
1.	5.5% of L	<u>10,213</u>
N.	<u>Total Costs*</u>	<u>\$195,911</u>

*This does not include costs for major data purchases.

Task 3.1.6 Commercialization Analysis

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 19,085
a. Geologist	6.0	
b. Draftsperson	2.0	
c. Secretarial	2.0	
2. Hourly		
a. Student	6.0	<u>3,510</u>
Total Salaries and Wages		\$ 22,595

B. Employee Benefits

1. 41.6% of A.1	\$ 7,939	
2. 7% of A.2	<u>245</u>	
Total Employee Benefits		\$ <u>8,184</u>

C. Total Salaries, Wages and Employee Benefits \$ 30,779

D. Expendable Supplies and Equipment 200

E. Travel 2,000

F. Reporting and Publications Costs 1,000

G. Data Processing 2,000

H. Other Costs -0-

I. Total Direct Costs \$ 35,979

J. Indirect Costs

1. 40% of I 14,392

K.	<u>General and Administrative</u>	
1.	12% of I	<u>4,317</u>
L.	<u>Total Direct, Indirect Costs and G&A</u>	\$ 54,688
M.	<u>Management Allowance</u>	
1.	5.5% of L	<u>3,007</u>
N.	<u>Total Costs</u>	\$ 57,695

Task 3.1.7 Applications Development Phase II Program Planning

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 1,185
a. Geologist	.25	
b. Draftsperson	.25	
c. Secretarial	.25	
2. Hourly		<u>-0-</u>
Total Salaries and Wages		\$ 1,185

B. Employee Benefits

1. 41.6% of A.1		<u>493</u>
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C. Total Salaries, Wages and Employee Benefits \$ 1,678

D. Expendable Supplies and Equipment 500

E. Travel 750

F. Reporting and Publications Costs 200

G. Data Processing 200

H. Other Costs -0-

I. Total Direct Costs \$ 3,328

J. Indirect Costs

1. 40% of I		1,331
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K. General and Administrative

1. 12% of I		<u>\$ 399</u>
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L.	<u>Total Direct, Indirect Costs and G&A</u>	\$ 5,058
M.	<u>Management Allowance</u>	
	1. 5.5% of L	<u>278</u>
N.	<u>Total Costs</u>	<u>\$ 5,336</u>

Task 3.1.8 Applications Development Project Management and Coordination

A. Salaries and Wages

1. Salaried	<u>Man Months</u>	\$ 14,190
a. Geologist	2.5	
b. Geophysicist	.25	
c. Computer Programmer	1.5	
d. Draftsperson	1.5	
e. Secretarial	.75	
2. Hourly		
a. Student	3.75	<u>2,195</u>
Total Salaries and Wages		\$ 16,385

B. Employee Benefits

1. 41.6% of A.1	\$ 5,903	
2. 7% of A.2	<u>154</u>	
Total Employee Benefits		\$ <u>6,057</u>

C. Total Salaries, Wages and Employee Benefits \$ 22,442

D. Expendable Supplies and Equipment 200

E. Travel 1,000

F. Reporting and Publications Costs 1,000

G. Data Processing 1,000

H. Other Costs -0-

I. Total Direct Costs \$ 25,642

J. Indirect Costs

1. 40% of I	10,257
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K.	<u>General and Administrative</u>	
1.	12% of I	<u>3,077</u>
L.	<u>Total Direct, Indirect Costs and G&A</u>	\$ 38,976
M.	<u>Management Allowance</u>	
1.	5.5% of L	<u>2,144</u>
N.	<u>Total Costs*</u>	<u>\$ 41,120</u>

*This does not include major data purchases.